REMARKS

The invention as presently claimed relates to assay devices for determining the presence or amount of an analyte of interest in a sample, and kits containing such devices. The devices of the present invention comprise, *inter alia*, the following elements: (i) a reaction chamber comprising an optically detectable label; (ii) a diagnostic lane comprising at least one assay zone that binds to the analyte of interest and at least one timing zone; (iii) an optical component for detecting an optical signal generated from the timing zone and generating an electronic signal in response; and (iv) a signal processor to read the electronic signal and determine the progress of the assay, and its time of completion.

A signal obtained from the timing zone of the present invention "allows the instrument to judge when the assay process is complete." Specification, page 40, lines 18-19. The "timing zone" referred to in the instant claims is described in the specification as one embodiment of "independent assay controls" (IAC) for use in monitoring and performing assays. IACs provide a measurable signal that is generated in connection with, but that is independent of, the signal obtained from the assay for an analyte of interest.

Claims 27, 28, and 93-111 are pending. Claims 27, 96, 97 and 105 have been amended herein and new claims 109-128 have been added. The specification provides support for an assay zone separate from a timing zone (e.g. page 15, lines 19-28). That the assay zone and the timing zone may be in one or more diagnostic lanes finds basis at page 15, lines 19-30, for example. Claim 111 finds basis at page 7, lines 21-22 while basis for claim 112 can be found at page 13, lines 7-15. Accordingly, the amendments and new claims raise no issue of new matter. It is noted that the amendments of the claims have not been made to obviate prior art but rather have been made to emphasize features of the invention for better understanding by the examiner.

In Paper No. 19, the Examiner reopens prosecution of pending claims 27, 28, and 93-108 in view of Applicants' Appeal Brief submitted on December 19, 2002. Applicants respectfully request reconsideration of the rejected claims in view of the following remarks.

As a preliminary matter, Applicants note that the Office Action Summary of Paper 19 indicates that the Office Action is final, while page 13 of the Office Action, paragraph 8, makes

clear that the action is non-final. Applicants assume that the Examiner's comments are controlly and that the Office Action Summary is in error. – respond LVC 10/29/03

Non Art-Related Remarks

Information Disclosure Statement

The Examiner indicates that the publications referred to in the unsigned information disclosure statement submitted by Applicants in the instant application have not been considered. Paper No. 19, page 2. Applicants respectfully submit that the Examiner has misunderstood the purpose of the unsigned information disclosure statement submitted by Applicants. Nevertheless, in the interest of furthering prosecution, Applicant files herewith a new Information Disclosure Statement in accordance with 37 C.F.R. § 1.98(d) and MPEP § 609(I)(A)(2). The examiner is requested to consider the references and indicate as such in the next communication in accordance with the cited provisions. consider

35 U.S.C. § 112, Second Paragraph

Applicants respectfully traverse the rejection of claims 28 and 101-108 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite with regard to the phrase "timing zone." Applicants submit that the examiner is incorrect that the phrase should be considered a "relative term," or that the absence of further definition of the phrase in the claim renders the term indefinite.

When determining definiteness, the proper standard to be applied is "whether one skilled in the art would understand the bounds of the claim when read in the light of the specification." *Credle v. Bond*, 30 USPQ2d 1911, 1919 (Fed. Cir. 1994). Recognizing that the English language is not always precise, the settled law has established that the essential inquiry in a definiteness analysis is whether the claims set out and circumscribe the claimed subject matter with reasonable particularity. *See, e.g.*, MPEP § 2173.02; *see also, Miles Laboratories, Inc. v. Shandon, Inc.*, 27 USPQ2d 1123, 1127 (Fed. Cir. 1993) ("If the claims read in the light of the specification reasonably apprise those skilled in the art of the scope of the invention, § 112

demands no more.") (emphasis added) Definiteness is not analyzed in a vacuum, but in light of the content of the specification, and with the knowledge available to the skilled artisan.

As discussed above, the present claims refer to devices for measuring the presence or amount of at least one analyte. The "timing zone" referred to in the instant claims is described in the specification as one embodiment of "independent assay controls" (IAC) that provide a measurable signal that is generated in connection with, but that is independent of, the signal obtained from the assay for the analyte of interest. As described in the instant specification, *e.g.*, beginning on page 73, section entitled "*Use of the Timing Signal to Detect Assay Completion of Immunoassay Devices*," the phrase "timing zone" refers to an element of the claimed assay devices where an IAC signal is detected for use in determining if the assay for the analyte of interest has run to completion. Methods and devices for determining the progress and time of completion of such an assay using an IAC signal obtained from a "timing zone" are described in detail in the instant specification, *e.g.*, on page 13, line 7, through page 14, line 15; page 40, line 9, through page 42, line 23; and page 73, line 6, through page 75, line 30. There is nothing indefinite about the metes and bounds of the timing zone as described in the application.

Moreover, the device configuration described in the claims clearly comports with the meaning of the "timing zone" as described in the specification. For example, part (a) of claim 27 recites a diagnostic lane comprising a timing zone; part (b) indicates that an optical component is configured to detect an optical signal from a label at the timing zone and to generate an electronic signal in response; and part (c) indicates that a signal processor is configured to determine the progress and time of completion of an analyte assay from the electronic signal.

Considering the extensive teachings in the instant specification concerning the design and use of timing zones to determine if an assay has run to completion, and the literal language of the claims, Applicants respectfully submit that the skilled artisan is reasonably apprised of the scope of the claims with regard to the phrase "timing zone" as used in the instant claims. As noted above, it is well settled that 35 U.S.C. § 112, second paragraph, demands no more.

In contrast, the Examiner asserts, without support or explanation, that the phrase "timing zone" should be considered a "relative term." Paper No. 19, page 3, last paragraph. Applicants

respectfully request that the Examiner provide objective evidence or reasoning explaining why the skilled artisan would consider a "timing zone" to be a relative term. Moreover, the Examiner's assertion that, because "the term 'timing zone' is not defined by the claim" (*id.*), the claim is rendered indefinite, is at odds with the requirement that the claims be interpreted in the light of the specification. *See, e.g.*, MPEP § 2173.02. In the instant case, the phrase "timing zone" should not be interpreted in a vacuum, but must be interpreted in light of the extensive teachings in the instant specification and from the point of view of one possessing the ordinary level of skill in the art. When properly considered in this light, the instant claims meet the definiteness standard of 35 U.S.C. § 112, second paragraph.

In view of the foregoing, Applicants respectfully submit that the skilled artisan is reasonably apprised of the scope of the claims with regard to the phrase "timing zone" as used in the instant claims. Thus, because the definiteness requirement of 35 U.S.C. § 112, second paragraph, has been met, Applicants respectfully request that the rejection be reconsidered and withdrawn.

35 U.S.C. § 112, First Paragraph

Applicants respectfully traverse the rejection of claims 27, 28 and 101-108 under 35 U.S.C. § 112, first paragraph, as allegedly failing to satisfy the written description requirement with regard to the phrase "timing zone." Applicants submit that the examiner is incorrect that the phrase "is not found in the instant application." Paper No. 19, page 4.

The proper standard for determining compliance with the written description requirement of 35 U.S.C. § 112, first paragraph, is whether the specification reasonably conveys to the skilled artisan that the inventor was in possession of the claimed invention as of the filing date. *See* MPEP § 2163.02 (citing *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 227 USPQ 177, 179 (Fed. Cir. 1985)). The subject matter of the claimed invention need not be described literally in the specification in order to satisfy the requirements of 35 U.S.C. § 112, first paragraph. *Id.* In a careful analysis of the written description requirement provided by Patent and Trademark Office in its *Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112 ¶1, "Written Description" Requirement*, it is stated that an adequate written description "may be shown by any description of sufficient, relevant, identifying characteristics so long as a person skilled in

the art would recognize that the inventor had possession of the claimed invention." 66 Fed. Reg. 1099, 1105 (2001) (emphasis added).

The phrase "timing zone" is found verbatim in Example 15 (page 71, line 3-5; page 73, line 25; page 74, line 3.) and throughout the specification under the related phrase "timing IAC." See, e.g., page 13, line 7, through page 14, line 15; page 40, line 9, through page 42, line 23; and page 73, line 6, through page 75, line 30. The use of the phrase "timing zone" to refer to device elements in this context may be found in the instant specification, *e.g.*, on page 71, lines 3-5; page 73, line 25; page 74, line 3.

Because the written description requirement of 35 U.S.C. § 112, first paragraph, has been met, Applicants respectfully request that the rejection be reconsidered and withdrawn.

Art-Related Remarks

35 U.S.C. §103

Applicants respectfully traverse the rejection of claims 27, 93, 94, and 96-100 as allegedly being unpatentable over Buechler *et al.*, U.S. Patent No. 5,458,852 ("the '852 patent") in view of Van Deusen *et al.*, U.S. Patent No. 5,132,097 ("the '097 patent"). Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three criteria must be met: there must be some motivation or suggestion, either in the cited references or in knowledge available to the ordinarily skilled artisan, to modify or combine the references; there must be a reasonable expectation of success in combining the references; and the references must teach or suggest all of the claim limitations. *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991) See also MPEP §2143.

As described above, the devices of the present invention comprise, *inter alia*, the following elements: (i) a reaction chamber comprising an optically detectable label; (ii) a diagnostic lane comprising at least one assay zone configured to bind the analyte of interest, and at least one timing zone; (iii) an optical component for detecting an optical signal generated from the timing zone and generating an electronic signal in response; and (iv) a signal processor to read the electronic signal and determine the progress of the assay, and its time of completion.

See, e.g., claim 27. As also described above, the phrase "timing zone" refers to an element of the claimed assay devices where an independent assay control signal is detected for use in determining if the assay for the analyte of interest has run to completion.

The present rejection is based on flawed understanding of the prior art references. The examiner states that the primary '852 patent discloses "a time gate for measuring the reaction in a given period of time." Paper No. 19, page 5, emphasis added. Though unstated, the Examiner apparently believes that the "time gate" of the primary '852 patent corresponds to the "timing zone" of the instant claims. Paper No. 19, page 5. It is respectfully submitted that the cited text allegedly supporting this view from column 7, lines 41-45 of the '852 patent, shown below, is wholly lacking in support.

Time Gate

> Referring to FIG. 1a, the time gate 5 holds the reaction mixture in the reaction chamber 4 for a given period of time. The concept of the time gate is that a predominantly aqueous solution cannot pass through a hydrophobic zone until the hydrophobic zone is made hydrophilic.

The "time gate" disclosed in the '852 patent is not configured to provide any signal whatsoever, much less a signal indicating the progress of the assay and its time of completion (as required in order to meet the limitation of a "timing zone"). Instead, the primary '852 patent teaches that the time gate is a restraint that holds the reaction mixture in the reaction chamber (of the device) for a given period of time. Nothing in this passage of the primary '852 patent cited by the Examiner indicates anything about "measuring the reaction" as the Examiner asserts.

Also flawed is the statement that the '852 patent teaches that "the rate of change is monitored by the flow of reagents through the porous member." Paper no. 19, page 5. It is respectfully submitted that the cited text allegedly supporting this view at column 18, lines 2-8 of the '852 patent, shown below, is wholly lacking in support.

> The time gate can also be incorporated into the aforementioned devices or the time gate may be used alone in conjunction with devices incorporating porous members. The fluid control means can also be used in devices incorporating porous members to control the rate of flow of reagents through the porous member.

There is simply nothing in this text that states to monitor the rate of change of the flow of reagents.

Yet another deficiency in the characterization of the primary '852 patent reference is the statement that "the label (signal development element) does not appreciably bind to any reagent in the assay device but could be designed to indirectly cause a visually or instrumentally detectable signal as a result of the assay process." Paper No. 19, page 5, emphasis added. Applicants respectfully submit that the mere fact that the devices of the primary '852 patent "could be designed" to meet some limitation of the present claims is insufficient to establish that such devices meet the requirements of the instant claims, or to establish a motivation to modify the devices of the cited publication to do so. To establish inherency, the Examiner must establish that the characteristic(s) in question must necessarily be provided by the cited publication. *See, e.g.*, MPEP §2112. To establish a motivation to modify the devices, the Examiner must provide some motivation or suggestion, either in the cited references or in knowledge available to the ordinarily skilled artisan to do so. *See, e.g.*, MPEP §2143. The Examiner has not met either burden.

Finally, the Examiner notes that the primary '852 patent fails to disclose "the detailed structure of the optical system including an optical component and a signal processor specifically configured to read electronic signals." Paper No. 19, page 6. For this element, the Examiner relies on the secondary '097 patent. But the Examiner ignores the fact that the instant claims do not refer to simply a signal processor configured to read electronic signals, but rather to a signal processor configured to determine the progress and time of completion of an assay from a timing zone.

Applicants respectfully submit that nothing in either cited patent, whether considered separately or in combination, discloses or suggests that a timing zone should be provided in a device, that the timing zone be configured to bind a detectable label which does not bind appreciably to the assay zone, that an optical component should be configured to read a signal from such a timing zone, or that a signal processor should be configured to determine the progress and time of completion of an assay for an analyte of interest from the timing zone signal. Therefore, because the cited patents, taken individually or in combination, fail to teach or

suggest each and every element of the instantly claimed invention, Applicants respectfully request that the rejection of claims 27, 93, 94 and 96-108 under 35 U.S.C. § 103 be reconsidered and withdrawn.

Applicants also respectfully traverse the rejection of claim 95 as allegedly being unpatentable over the primary '852 patent in view of the secondary '097 patent and in further view of Slovacek *et al.*, U.S. Patent No. 5,242,837 ("the '837 patent"); of claims 28, 101, 102, and 104-108 as allegedly being unpatentable over the primary '852 patent in view of the secondary '097 patent and in further view of Zuk *et al.*, U.S. Patent No. 4,281,061 ("the '061 patent"); and of claim 103 as allegedly being unpatentable over the primary '852 patent in view of the secondary '097 patent and in further view of both the '837 and '061 patents.

The Examiner's flawed *prima facie* case of obviousness regarding the primary '852 and secondary '097 patents also underpins the obviousness rejections of these claims. As in the rejections now withdrawn in view of Applicants' Appeal Brief, the Examiner merely contends that the further secondary '837 and '061 patents disclose the use of fluorometers and the provision of assay reagents as kits, respectively. Paper No. 19, pages 7-9.

Thus, for the same reasons discussed in detail above, the Examiner has failed to meet the burden of establishing a *prima facie* case of obviousness. Because the cited patents, taken individually or in combination, fail to teach or suggest each and every element of the instantly claimed invention, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

Applicants respectfully traverse the rejection of claims 27, 93, 94, and 96-100 as allegedly being unpatentable over May *et al.*, U.S. Patent No. 6,187,598 ("the '598 patent") in view of the Van Deusen *et al.* '097 patent. Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness.

The Examiner, referring to column 2, line 46, through column 3, line 7, of the primary '598 patent, asserts that "May et al. disclose assay devices meeting the requirements of the instant invention." Paper No. 19, page 9, last full paragraph. But Applicants respectfully submit that the Examiner does not indicate how any particular element of the devices disclosed in the

primary '598 patent read on any element of the claimed invention, much less each and every element of the claimed invention as required under law. Instead, the Examiner points to one section of the primary '598 patent, which simply discloses a "sandwich" immunoassay (column 2, lines 46-54) and a competitive immunoassay (column 2, line 55, through column 3, line 7). Paper No. 19, page 9, last full paragraph. Applicants respectfully submit that this does not meet the Examiner's initial burden for establishing a *prima facie* case of obviousness.

Furthermore, nothing in the primary '598 patent discloses, for example, that a timing zone should be provided in a device, that an optical component should be configured to read a signal from such a timing zone, or that a signal processor should be configured to determine the progress and time of completion of an assay for an analyte of interest from the timing zone signal.

As in the rejection based on the Buechler et al. '852 patent, the Examiner notes that the primary '598 patent fails to disclose "the device with an optical component and a signal processor specifically configured to read electronic signals." Paper No. 19, page 9. For this element, the Examiner again relies on the same secondary '097 patent. But again the Examiner ignores the fact that the instant claims do not refer to simply a signal processor configured to read electronic signals, but rather to a signal processor configured to determine the progress and time of completion of an assay from a timing zone.

Applicants respectfully submit that nothing in the cited patents, whether considered individually or in combination, discloses or suggests that a timing zone should be provided in a device, that an optical component should be configured to read a signal from such a timing zone, or that a signal processor should be configured to determine the progress and time of completion of an assay for an analyte of interest from the timing zone signal. Therefore, because the cited patents, taken individually or in combination, fail to teach or suggest each and every element of the instantly claimed invention, Applicants respectfully request that the rejection of claims 27, 93, 94 and 96-108 under 35 U.S.C. § 103 be reconsidered and withdrawn.

Applicants also respectfully traverse the rejection of claim 95 as allegedly being unpatentable over the primary '598 patent in view of the secondary '097 patent and in further view of Slovacek *et al.*, U.S. Patent No. 5,242,837 ("the '837 patent"); of claims 28, 101, 102,

and 104-108 as allegedly being unpatentable over the primary '598 patent in view of the secondary '097 patent and in further view of Zuk *et al.*, U.S. Patent No. 4,281,061 ("the '061 patent"); and of claim 103 as allegedly being unpatentable over the primary '598 patent in view of the secondary '097 patent and in further view of both the '837 and '061 patents.

The Examiner's fatally flawed *prima facie* case of obviousness regarding the primary '598 and secondary '097 patents also underpins the obviousness rejections of these claims. As in the rejection based on the Buechler et al. '852 patent, the Examiner merely contends that the further secondary '837 and '061 patents discloses the use of fluorometers and the provision of assay reagents as kits, respectively. Paper No. 19, pages 11-13.

Thus, for the same reasons discussed in detail above, the Examiner has failed to meet the burden of establishing a *prima facie* case of obviousness. Because the cited patents, taken individually or in combination, fail to teach or suggest each and every element of the instantly claimed invention, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully submit that the pending claims are in condition for allowance. An early notice to that effect is earnestly solicited. Should any matters remain outstanding, the Examiner is encouraged to contact the undersigned at the telephone number listed below so that they may be resolved without the need for additional action and response thereto.

Respectfully submitted,

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